

10 Summary of Supplemental Remedial Investigation Data

During November 2001 to February 2002, a Supplemental RI was conducted to fill data gaps identified since the Draft RI Report was submitted in 1996. This Supplemental RI Report completes the assessment of the nature and extent of contaminants in the soil, groundwater, and sediment associated with the former BNSF maintenance and fueling facility in Skykomish, Washington. The Supplemental RI fieldwork included advancing 32 additional boreholes, installing 25 monitoring wells, and collecting sediment samples from eight additional locations along the former channel of Maloney Creek and in a drainage ditch at the western edge of the rail yard. Selected samples from each environmental media were analyzed for TPH, BTEX, PAH, EPH/VPH, PCBs, dioxins, lead, and arsenic. In addition, numerous surface soil samples were collected throughout the rail yard and adjacent residential, commercial, and public use areas for analyses of lead and arsenic. An investigation was conducted during July 2001 to assess the effects of hydrocarbon seeps along the Skykomish River, in which sediment samples were collected, biological testing was performed. In addition, BNSF has completed voluntary sediment sampling for benthic infauna analysis to assist with understanding impacts to the river and developing sediment cleanup standards. The results of this sampling event will be provided to Ecology in a technical memorandum separate from the Supplemental RI Report.

This Supplemental RI Report presents all data, as well as data from all other investigations that have been conducted since the Draft RI Report to further define the nature and extent of contamination associated with the former maintenance and fueling facility.

The major objectives of the RI are: (1) to characterize nature and extent of contamination resulting from the former maintenance and fueling activities and characterize current conditions, and (2) to provide sufficient data and other information to prepare a feasibility study. Large amounts of data have already been collected during the initial RI and in subsequent, pre-Supplemental RI investigations. The Supplemental RI fieldwork has been conducted to meet the following specific objectives.

10.1 Assess Impacts to the Skykomish River

Pre-Supplemental RI data indicate that the Skykomish River has been impacted by petroleum seeps along the riverbank west of the bridge. To assess the effects of the petroleum seeps, sediment samples were collected from the Skykomish River during the summer of 2001 to determine the extent, magnitude, and potential impacts of contamination. In addition, bioassay toxicity testing was conducted, and a quantitative benthic infauna investigation has been conducted in the vicinity of seeps on the southern shore

of the South Fork of the Skykomish River. The investigations conducted on the Skykomish River indicated that the sediments in the areas near the seeps contain high concentrations of petroleum hydrocarbons, and the toxicity of the sediments in the seep area is high; however, the results of the benthic infaunal sampling indicate that benthic communities in areas near the seeps do not appear to be impacted. Furthermore, the diverse and abundant benthic infauna community indicates that adequate food sources in the seep areas are available for anadromous and other fishes.

During the autumn of 2001, a subsurface barrier wall and recovery wells were installed to reduce migration of contaminants into the Skykomish River. The initial RI data indicated that the wall has been located in the area with the greatest probable impacts to the river. The Supplemental RI fieldwork collected additional data to assess whether there may be additional impacts that have not been addressed by the installation of the barrier wall and LNAPL recovery system, including sampling additional wells and boreholes. The Supplemental RI data have led to new conclusions regarding the location and dimensions of the LNAPL plume; however, the new data also indicate that there are probably no additional areas of LNAPL that impact the Skykomish River.

10.2 Define Extent of LNAPL Plume

The Draft RI Report identifies an LNAPL and dissolved contaminant plume extending north from the rail yard to the Skykomish River. The Draft RI Report (RETEC, 1996) presented results of the free-LNAPL physical characteristics (viscosity equals 1035 to 95350 centipoise, and specific gravity equals 0.97 to 0.99). The Supplemental RI provides additional data to fill gaps regarding the lateral extent of the plume. These additional data included additional wells and borings in the plume and in its immediate vicinity. Wells have been completed within and outside the formerly defined plume in areas where further definition of the plume extent was necessary. The newly constructed wells and existing wells were all gauged for water levels and LNAPL thickness during the Supplemental RI. The gauging data indicate that the free-phase LNAPL plume is less extensive than previously estimated prior to the Supplemental RI fieldwork. The gauging data indicate that the LNAPL plume which extends from the rail yard towards the subsurface barrier wall and river is smaller than previously estimated and that the LNAPL appears to form two distinct, smaller bodies rather than one large plume depicted in previous figures. This different interpretation is due in part to additional data points available for the Supplemental RI. It may also be due to a combination of free LNAPL migration from the railyard to the northwest and attenuation of the free LNAPL as it migrates downgradient. This implies that there is substantially less free-phase LNAPL oil in the subsurface than previously estimated. The conclusion will be important in developing cleanup action alternatives in the FS.

Dissolved concentrations of TPH in groundwater were also analyzed from new and existing wells during the Supplemental RI. The groundwater data are consistent with the initial RI data; higher concentrations of dissolved TPH are closely associated with areas where there is free product in the soil and floating on the water table. However, the data also show that groundwater within areas of residual LNAPL, that is high concentrations of product in the soil at or below the water table that will not flow into recovery wells, may also contain high concentrations of dissolved TPH. PAHs were analyzed from selected wells throughout the site. The data show that PAHs have not been detected within approximately 300 feet of the river. This may reflect a zone within which additional dissolved oxygen has been introduced into the groundwater due to interaction between the river and the groundwater during high river flows. At these times, there may even be a temporary reversal of flow so that the river loses water to the aquifer. The increased dissolved oxygen may result in enhanced attenuation or biological degradation of the PAHs in groundwater. Additional monitoring for natural attenuation parameters in groundwater would be required to assess whether natural attenuation may be occurring.

10.3 Investigate Former Maloney Creek Channel

Ecology and BNSF have received anecdotal accounts that “PCB oil” was discharged onto the ground near the former electrical transformer pad in the rail yard and from a steel oil trap through a (former) ditch that previously conveyed stormwater into Maloney Creek. Soil samples have been collected and analyzed for PCBs and TPH from the ground surrounding the former transformer pad, and sediment samples have been collected from the bed of Maloney Creek to evaluate the soil and sediment quality in the immediate vicinities of these suspected areas of contamination. The data show that there are elevated concentrations of TPH in the vicinity of the oil trap and ditch from the surface zone to the smear zone, and therefore the ditch may have conveyed petroleum hydrocarbons along with stormwater into Maloney Creek. Furthermore the sediment in Maloney Creek shows significantly elevated concentrations in TPH in the surface zone and smear zone at the location where the ditch apparently flowed into the creek. The sediment in Maloney Creek farther to the west and adjacent to the transformer pads also contains elevated TPH concentrations. However, the source of the TPH at these locations is not clear from the data, since the data indicate that the TPH could have originated from farther upstream, from surface runoff from the transformer pads, or from an area of contamination around MW-39 on the south side of the creek. PCBs analyses were performed on soil samples from the location of the former transformer pads and from the sediment samples. PCBs were not detected in the soil samples in the immediate vicinity of the transformer pads or in the sediment. The Supplemental RI data show that, if PCB oil was discharged onto the ground surrounding the transformer pads,

then the PCBs are no longer present in detectable concentrations. The data further suggest that the source of oil detected in Maloney Creek is not “PCB oil.”

10.4 Define Rail Yard Contamination

The rail yard is a potential, ongoing source area for groundwater contamination. The extent of contamination in the rail yard was evaluated further through the installation of additional soil borings and monitoring wells.

The Supplemental RI data improve our understanding of the extent and nature of TPH and other contaminants in soil and the effect that soil has on groundwater. Soil samples collected from the surface zone and vadose zone, in the vicinity of the former oil tank and electrical substation, contained relatively high concentrations of TPH. The data indicate that the chemistry of the petroleum hydrocarbons varies throughout the rail yard. More specifically, the groundwater near LNAPL plumes at MW-39 and MW-11 contains PAHs not detected in the LNAPL plumes that extend from the rail yard to the subsurface barrier wall and the river, and the carbon ranges, as measured by EPH/VPH analyses, also suggest a different groundwater chemistry.

In addition to petroleum hydrocarbons, lead and arsenic analyses were performed on selected soil samples from the rail yard. The initial RI found that elevated lead and arsenic concentrations were present primarily within the rail yard boundaries, with the highest lead concentrations near the former electrical substation area, around the current maintenance building, and around railroad tracks in the eastern portion of the facility. During the Supplemental RI, the surface soil was systematically sampled for lead and arsenic on a grid in the vicinity of the former substation and in the eastern portion of the rail yard. The data indicate that arsenic impacts are limited to surface soils on the rail yard primarily near the former offloading pits and the maintenance buildings. The data also indicate that lead impacts are elevated on the rail yard consistent with historic rail yard operations.

10.5 Define Off-Site Contamination

Ecology and BNSF have received anecdotal reports from residents of historic oil contamination in areas that were not sampled as part of the initial RI. During the Supplemental RI, soil samples were collected from these and other areas to better define the nature and extent of contamination associated with the former maintenance and fueling facility. In addition, wells were been installed and sampled in these areas to further define the nature and extent of groundwater contamination, and to assess whether the former maintenance and fueling facility affected these areas.

- 1) The first area of concern was a yard at the northwest end of Second Street. The borehole and well 1C-W-1 was installed at this location and soil and groundwater samples have been collected. No TPH contamination was detected in surface soil at this location, although an elevated concentration of TPH was present in the soil sample collected from the smear zone. The well was free of LNAPL; however, a groundwater sample from the well contained elevated TPH. The findings at this location suggest that contamination is present in the smear zone only, and there is no evidence of overland flow of petroleum hydrocarbons. The contamination in the smear zone is consistent with results in the adjacent wells that indicate that there is a plume of dissolved TPH extending into this area.
- 2) The second area of concern was the possibility of elevated lead and arsenic in the surface soils in residential, commercial and public areas north of the rail yard. Surface soil samples were collected from the properties north of the rail yard and analyzed for lead and arsenic. Arsenic concentrations in surface soil north of the rail yard are comparable to local background conditions. Some elevated lead concentrations are present in surface soil north of the rail yard; however, there is no clear pattern in the distribution of the lead. The scattered distribution of the elevated lead concentrations is not indicative of particulate wind dispersion.
- 3) The third area of concern was that oil containing PCBs may have been used around town for dust suppression on roads. Soil samples were collected from the material immediately underlying the town roads and the samples were analyzed for PCBs. No PCBs were detected in the samples. In addition, data on the rail yard soils show that PCB levels near the former electrical transformer are low, indicating that it is unlikely that there was any "PCB oil" used in the transformers that could, in turn, have been used on town roads to suppress dust.